

at *Fort Lyon and 20° at Denver. *New Mexico*: 26° at Santa Fe. *Wyoming*: 18° at Cheyenne. *Utah*: 33° at Salt Lake City. *Nevada*: 21° at *Carson City and 23° at Winnemucca. *Arizona*: 26° at Fort Apache. *Idaho*: 8° at *Fort Hall and 25° at Boise City. *California*: 24° at Campo. *Oregon*: 17° at Umatilla.

Maximum Temperatures.—*Maine*: 85° at *West Waterville and *Orono and 83° at Portland. *New Hampshire*: 84° at *Dunbarton, *Contoocookville and *Grafton. *Vermont*: 78° at Burlington and 84° at *Lunenburg. *Massachusetts*: 90° at *Somerset and 88° at Boston. *Rhode Island*: 83° at *Fort Adams and 81° at Newport. *Connecticut*: 92° at *Mystic and 83° at New Haven and New London. *New York*: 92° at *Nile and 88° at New York City. *Pennsylvania*: 91° at Pittsburgh. *Delaware*: 83° at *Dover. *Maryland*: 89° at *Emmitsburg and Baltimore. *District of Columbia*: 92° at Washington. *Virginia*: 91° at *Mount Solon and *Accotink, and 90° at Fort Whipple. *West Virginia*: 85° at Morgantown and 86° at *Helvetia. *North Carolina*: 92° at *Weldon and 87° at Charlotte. *South Carolina*: 87° at *Aiken and Charleston. *Georgia*: 32° at *Gainesville and 89° at Augusta. *Florida*: 89° at Punta Rassa and 98° at *Houston. *Alabama*: 90° at Mobile. *Mississippi*: 90° at Vicksburg. *Louisiana*: 89° at Shreveport. *Texas*: 100° at Pilot Point. *Ohio*: 94° at *Jacksonburg and *Norwalk, and 87° at Cleveland and Sandusky. *Kentucky*: 88° at Louisville. *Tennessee*: 96° at Knoxville. *Arkansas*: 89° at Little Rock. *Michigan*: 89° at *Lausling and 87° at Marquette. *Indiana*: 90° at *New Corydon and *Logansport, and 86° at Indianapolis. *Illinois*: 90° at *Peoria, *Hinsdale and *Decatur, and 87° at Cairo. *Missouri*: 90° at St. Louis and 97° at *Booneville. *Kansas*: 84° at Leavenworth and 91° at *Fort Wallace. *Wisconsin*: 87° at *Beloit, and 84° at Madison and La Crosse. *Iowa*: 87° at Keokuk and 90° at *Guttenburg. *Nebraska*: 93° at *Fort McPherson and 89° at North Platte. *Indian Territory*: 90° at Fort Sill. *Minnesota*: 89° at Breckenridge. *Dakota*: 95° at *Morristown and Fort Buford. *Colorado*: 91° at *Fort Lyon and 84° at Denver. *New Mexico*: 92° at La Mesilla. *Wyoming*: 80° at Cheyenne. *Utah*: 82° at Salt Lake City. *Nevada*: 84° at Winnemucca and 89° at *Fort Halleck. *Arizona*: 102° at Yuma. *Idaho*: 85° at Boise City and 86° at *Fort Hall. *California*: 96° at Los Angeles. *Oregon*: 75° at Umatilla.

Ranges of Temperature at Signal-Service Stations.—The monthly ranges will appear from an examination of the maxima and minima given. The greatest daily ranges vary in New England from 21° at Wood's Holl to 26° at Eastport and 35° at Boston. Middle Atlantic States, from 21° at Cape May to 30° at Albany and 33° at Washington. South Atlantic States, from 15° Portsmouth, N. C., to 33° at Augusta. Gulf States, from 13° at Key West to 16° at New Orleans and 35° at Shreveport. Ohio valley and Tennessee, from 25° at Indianapolis to 28° at Cairo and 36° at Knoxville. Lower Lakes, from 22° at Erie to 25° at Detroit and 33° at Rochester. Upper Lakes, from 22° at Chicago to 35° at Marquette. Upper Mississippi valley, from 26° at Davenport to 32° at St. Paul. Red River of the North valley, from 45° at Pembina to 48° at Breckenridge. Lower Missouri valley, from 32° at Leavenworth to 52° at Fort Stevenson. Eastern Rocky Mountain Slope, from 32° at Denison, 43° at Fort Gibson, 48° at North Platte to 54° at Uvalde. Rocky Mountains, from 31° on Pike's Peak, 36° at Santa Fe, 34° at Virginia City to 48° at Denver. Northern and Middle Plateau districts, 31° at Pioche, 35° at Boise City to 48° at Winnemucca. California, 20° at San Francisco, 37° at Red Bluff to 43° at Los Angeles.

Frosts.—Frosts have been too numerous and frequent to permit their being enumerated in detail. In the Plateau districts frosts occurred from the 8th. At Visalia, Cal., 9th to 11th. In the extreme Northwest, from the 10th. In the Northwest, 11th and after. New England and Lake region, from the 14th; Missouri and Upper Mississippi valleys, from the 19th. Middle Atlantic States and Ohio valley, from the 20th. Tennessee, from the 24th. Virginia, 24th to 26th. Georgia, 25th. Northern Alabama, 24th and 25th. Northern half of Mississippi and Louisiana, 25th. Texas, interior, 25th and after. Pensacola, Fla., 29th, "very light."

Ice has been generally reported north of Arkansas, Tennessee and North Carolina from the 23rd. It was reported in the interior of Texas from the 24th to 27th, and Indian Territory, 24th and 25th, and at Charlotte, N. C. on 25th and 26th.

Ground Frozen.—Catawissa, Pa., 25th; Hinsdale, Ill., 31st; Oregon, Mo., 24th; Dyberry, Pa., 26th, two inches; Embarrass, Wis., 31st.

PRECIPITATION.

The general distribution of rain-fall for the month is illustrated as accurately as possible on Chart No. III, from about 500 reports; it is accompanied by a table giving the average precipitation for the month of October by districts. The rain-fall has been below the normal in all districts, excepting the South Atlantic and East Gulf States, the Lower Missouri valley, northern portions of Minnesota and Michigan and along the Pacific coast. In the Rocky Mountain region and Plateau Districts, the rain-fall has been moderate and probably about the normal amount for the month. Areas of quite small rain-fall are noticed in western Nevada, on the lee side of the Sierra Nevada; and over portions of Colorado and Kansas, similarly situated with regard to most elevated portion of the Rocky Mountains—no rain is reported. An examination of the Chart shows extensive areas of less than one inch rain-fall covering California, and the whole western half of the Plateau Districts, the Eastern Rocky Mountain slope from Dakota to Texas, the Upper Mississippi valley from Dubuque to St. Louis, the Southwest from southern Missouri to the Gulf coast, and two large areas including portions of the Ohio valley, Lower Lake region, Middle States and New England. Severe draughts are reported in all these sections, and throughout the country generally, rivers and springs are reported very low. These will be noted in detail under their respective headings.

Those marked with * are voluntary reports.

Annual Rainfall.—The following report of rainfall measured by James G. Swan, voluntary observer at Neah Bay, Clallam county, Washington Territory, for the year ending September 30, 1879, is published as being probably the heaviest rainfall during a single year ever reported in the United States: October, 1878, 12.76 inches; November, 19.71; December, 8.48; January, 1879, 13.93; February, 24.33; March, 23.83; April, 7.68; May, 7.14; June, 1.48; July, 4.63; August, 5.84; September, 4.90. Total, 134.71 inches. The heaviest rainfall of published records in possession of this office are those of Neah Bay, W. T., 1867, 126.50 inches; 1865, 121.30 inches, and Baton Rouge, La., 1846, 116.40 inches.

Special Heavy Rains.—1st, Rio Grande, Tex., 1.24 in. in 35 min. 2nd, Vicksburg, 1.25 in. in 2 hours and 35 minutes; Melissa, Tex., 2nd and 3rd, 4.50 in. in 27 hours; New Ulm, Tex., 2.38 in. in 1 hour and 5 minutes. 3rd, Indianola, Tex., 4.71 in. in 5 hours and 15 minutes; Mobile, La., 1.03 in. in 2 hours. 4th, Thomasville, Ga., 2.40 in. in 4 hours and 30 minutes; Austin, Tex., 1.10 in. in 3 hours. 9th, Highlands, N. C., 1.92 in. 10th, Savannah, Ga., 1.18 in. in 1 hour and 40 minutes; Ft. Halleck, Nev., 1.06 in.; Ft. Davis, Tex., 2.88 in. in 16 hours; Lawrence, Kan., 1.5 in. 11th, Independence, Mo., 2.72 in.; near Arlington Ind., 1.00 in. in 1 hour. 12th, Okaloosa, La., 1.05 in. in 4 hours. 13th, Key West, 4.22 in. 15th, Ft. Meade, Dak., 1.24 in. 16th, Deadwood, D. T., 2.92 in. in 17 hours; Montgomery, Ala., 2.10 in. in 8 hours and 30 minutes; Ames, Iowa, 2.30 in.; Nora Springs, La., 1.50 in. in 1 hour; Cresco, La., 1.65 in. in 12 hours; Cairo, Ill., 2.53 in. in 11 hours 30 min. 17th, Montgomery, Ala., 3.13 in. in 7 hours and 30 minutes; Lenoir, N. C., 17th to 19th, 6.50 in.; Highland, N. C., 17th to 20th, inclusive, 11.59 in. of which 7.50 in. fell on the 17th; Asheville, N. C., 17th to 18th, 6.40 in. in 4 hours. 18th, Gainesville, Ga., 16th to 18th, 5 in.; Aiken, S. C., 2.25 in.; Forsyth, Ga., 16th to 18th, 2.85 in.; Murphy, N. C., 4.30 in. in 28 hours; Webster, N. C., 16th to 18th, 6.70 in.; Franklin, N. C., 16th to 18th 7.00 in.; Fort Barrancas, Fla., 4.53 in.; Atlanta, Ga., 1.48 in. in 16 hours. 20th Quitman, Ga., 1.50 in. 22nd, Thomasville, Ga., 4.40 in. in 16 hours, of which 1.56 in. fell in minutes. 26th, Brownsville, Tex., 2.20 in. in 6 hours 30 min. 27th, Key West on 26th and 27th, 3.37 in.; Fort Barrancas, Fla., 3.04 in. 28th, Cape Hatteras, 3.00 in. in 8 hours 30 minutes.

Largest Monthly Rain-falls.—Highlands, N. C., 15.83 in.; Key West, Fla., 14.20 in.; Thomasville, Ga., 13.78 in.; St. Marks, Fla., 12.94 in.; Fort Barrancas, Fla., 12.11 in.; Franklin, N. C., 11.40 in.; Montgomery, Ala., 10.20 in.; Daytona, Fla., 9.96 in.; Jacksonville, Fla., 9.45 in.; Quitman, Ga., 8.50 in.; Lenoir, N. C., 8.40 in.; Webster and Asheville, N. C., 8.10 in.; Kitty Hawk, N. C., 7.90 in.; Forsyth, Ga., 7.86 in.; Gainesville, Ga., 7.60 in.; Charleston, S. C., 6.74 in.; Cape Hatteras, N. C., 5.86 in.; Paducah, Ky., 5.59 in.; Atlanta, Ga., 5.44 in.; Murphy, N. C., 5.30 in.; Wytheville, Va., 5.25 in.; Mobile, Ala., 5.15 in.; Snowville, Va., 5.10 in.; Mt. Washington, N. H., and Melissa, Tex., 5.03 in.

Smallest Monthly Rain-falls.—Ft. Lyon, Cal., and Ft. Wallace, Kan., none; Cumberland, Md., Fayette, Miss., and Hector, N. Y., trace; Ft. McDermit, Nev., 0.05 in.; Ft. McHenry, Md., and Mendon, Mass., 0.09 in.; Wickenburg, Ariz., 0.10 in.; Pilot, Tex., 0.11 in.; Spiceland, Ind., 0.14 in.; Ft. Sill, I. T., 0.15 in.; Carson City, Nev., 0.18 in.; Augusta, Ill., and Denver, Col., 0.19 in.; Concho, Tex., 0.20 in.; North Platte, Neb., and Brackettville, Tex., 0.21 in.; Fort Verde, Ariz., 0.23 in.; Norfolk, Va., 0.25 in.; Columbus, Ohio, 0.26 in.; Phoenix, Ariz., Laredo, Tex., and South Orange, N. J., 0.27 in.; Vevay, Ind., and Keokuk, Iowa, 0.28 in.; San Diego, Cal., 0.29 in.; Ruggles, Ohio, and Alcatraz Island, Cal., 0.30 in.; Linden, N. J. and Ithaca, N. Y., 0.31 in.; Patterson, N. J., 0.32 in.; Umatilla, Or., Yuma, A. T., and Yankton, D. T., 0.33 in.; Ashland, Wis., 0.35 in.; Prescott, Ariz., Pt. San Jose, Cal., and Lima, N. Y., 0.37 in.; Henrietta, Tex., and Ft. Columbus, N. Y., 0.38 in.; Margaretta, and Troy, Ohio, 0.40 in.; Philadelphia, Pa. 0.41 in.; Starkey, N. Y., 0.42 in.; Norwalk, Ohio, Wellsboro, and Hulmeville, Pa., 0.44 in.; Pen Yan, N. Y., 0.46 in.; Sandy Hook, N. J., 0.47 in.; Fallsington, Pa., 0.48 in.

Rainy Days.—The number of days on which rain or snow has fallen varies as follows: New England, from 5 to 13; Middle Atlantic States, 4 to 9; South Atlantic States, 4 to 20; Eastern Gulf States, 11 to 20; Western Gulf States, 5 to 10; Ohio valley and Tennessee, 6 to 10; Lower Lake region, 6 to 13; Upper Lake region, 9 to 15; Upper Mississippi valley, 4 to 10; Missouri valley, 7 to 9; Red River of the North valley, 6 to 11; Eastern Rocky Mountain slope, 1 to 5; Rocky Mountains, 1 to 4; California, 1 to 3.

Cloudy Days.—The number varies in New England from 4 to 17; Middle Atlantic States, 4 to 7; South Atlantic States, 5 to 18; Eastern Gulf States, 11 to 16, Western Gulf States, 2 to 5; Lower Lake region, 5 to 11; Upper Lake region, 7 to 14; Ohio valley and Tennessee, 3 to 9; Upper Mississippi valley, 3 to 6; Missouri valley, 2 to 5; Red River of the North valley, 3 to 11; Eastern Rocky Mountain Slope, 1 to 11; Rocky Mountains, 0 to 5; California, 3 to 5.

Hail.—Hail has been generally reported during the month from Indiana and Michigan eastward to New England, in the Northwest, the Middle Plateau and on Pike's Peak. On the 10th hail fell at Augusta, Ga. The only wide-spread fall appears to have been on the 28th, when hail fell generally along Lake Erie and in the Middle Atlantic States. No storm of unusual severity has been reported.

Snow.—From the Lake region and Ohio valley eastward to New England, and as far south as Maryland, light snow was reported on the 24th. In the Plateau districts it appeared as early as the 8th, and on the eastern slope of the Rocky Mountains from the 15th.

Depth of Snow on Ground at end of Month.—Fort Collins, Col., 1.5 inches; Pike's Peak, 6 to 10 inches; Mt. Washington, 0.5 inch.

Droughts.—West Charlotte, Vt., 25th, drought very severe; Lake Champlain lower than ever remembered in fifty years, and falling every day. Waltham, Mass., drought during last half of month. Hector, N. Y., severe drought throughout the month. 17th, Brooklyn, N. Y., "no rain has fallen here for a month, and wells on Staten Island and in Jersey City are drying up;" New York City, "comparison with records for past twenty years, shows that the rain-fall from September 1st to October 17th, has not been as low as this year;" Philadelphia, "in towns well up the Schuylkill a water famine is prevailing. The Schuylkill is lower than for an indefinite period. Hundreds of canal boats are laid up for want of water to move them; "the drought in southern Livingston and northern Steuben Cos., N. Y., has already caused great damage to pastures, winter wheat and late corn." Nile, N. Y., 31st, great scarcity of water, many wells dry. Newburg, N. Y., 19th, authorities ordered the greatest economy in using water for fear of famine. 17th, Farmers throughout Camden and Burlington Co's, N. J., report fall crops suffering for want of rain and that water for domestic uses is difficult to obtain. Such an extended spell of dry weather has not been known for years in west and south Jersey." Lindeu, N. J., during 45 days rain-fall only 0.32; great scarcity of water. Wellsboro, Pa., drought unprecedented; the Tioga and Cowanesque rivers nearly dry; streams, springs and wells dry; water for domestic use hauled long distances. Schuylkill Co., Pa., severe drought continuing still on the 11th; many collieries stopped for a lack of water, crops already injured; at Mahanoy Plane "the wells in the town have been exhausted for some time, and the people are obliged to bring water half-a-mile." Harbour Creek, Pa., "people suffering from the effects of a prolonged drought; streams, springs and wells that never failed before are now nearly exhausted." Reading, Pa., "very severe drought; no rain has fallen for many weeks, streams, wells and springs are all drying up; water supply for city entirely inadequate for domestic uses." Pittsburg, Pa., "very severe drought is still prevailing in the surrounding country, wells dry, pastures scorched and burned up, and stock suffering severely for want of food and water." Catawissa, Pa., "severe drought during the entire month, streams unusually low, and nearly all wells exhausted. North branch of the Susquehanna river at this place two inches lower than established low water mark." Dyberry, Pa., 31st, "water for domestic purposes carried long distances, many wells and springs drying up." Fallston, Md., in "45 days preceding October 20th only 0.30 inches rain-fall, many springs and wells exhausted." Petersburg, Va., 26th, "mills which have been on quarter capacity for lack of water commenced running full capacity from late rains." Walnut Grove, Va., driest October for many years. West Liberty, Ohio, 31st, the whole country about suffering for want of rain. Ringgold, Ohio, 17th to 30th, severe drought. North Lewisburg, Ohio, 31st, exceedingly dry, only 0.63 inches of rain has fallen in the last 42 days. Westerville, Ohio, 31st, wells failing. Little Mountain, Ohio, "the driest October ever observed." Augusta, Ill., 21st, wells getting dry and water scarce. Springfield, Ill., 24th, all railroads leading into the city were obliged to run daily water trains on account of the drought. Wabash, Ind., "greater deficiency in the rainfall of the present month than for the month of October during the past 14 years; creeks and springs never before known to fail are dry; the greatest scarcity of water prevails in all sections of the country remote from the river, which at this place is lower than ever known before." Embarrass, Wis., 31st, brooks and rivers very low and many wells dry. Fort Madison, Ia., drought worse than last month. Prof. Nipher, of Missouri Weather Service, reports it "the driest October in 40 years; the area of smallest rain-fall extending from St. Louis to the northwest, its western boundary being the summit of the "divide" between the drainage systems of the Missouri and Mississippi rivers." Chattanooga, Tenn., 3rd, "drought is commencing to be felt." Fayette, Miss., 31st, vegetation scorched and water very scarce. Clarks-ville, Tex., "month has been very dry, and the earth is so parched that but little winter grain has been sown." Melissa, Tex., 2nd, drought of August and September ended. Sulphur Springs, Tex., 29th, the "long drought still continues." Coalville, Utah, 7th, "very dry, first rain since April." Winnemucca, Nev., 22nd, "Humboldt river is reported very low, and fears are entertained of a scarcity of water." Cloverdale, Cal. 31st, many places in Russian river dry.

RELATIVE HUMIDITY.

The percentages of mean Relative Humidity for the month range as follows: New England, 64 to 81; Middle Atlantic States, 66 to 80; South Atlantic States, 68 to 82; Eastern Gulf States, 72 to 82; Western Gulf States, 64 to 72; Ohio valley and Tennessee, 59 to 74; Lower Lakes, 65 to 74; Upper Lakes, 65 to 77; Upper Mississippi valley, 60 to 65; Lower Missouri valley, 59 to 65; Red River of the North valley, 61 to 75; Northern Rocky Mountain Slope, 52 to 59; Texas, 49 to 82; Southern Plateau districts, 32 to 54; California, 48 to 69; Oregon, 74 to 80. *High stations* report the following averages, not corrected for altitude: Mt. Washington, 88.3; Cheyenne, 33; Denver, 35.6; Santa Fe, 41.5; Pike's Peak, 42.7; Virginia City, 48.4.

WINDS.

Total Movements of the Air.—The following were the largest monthly movements in miles recorded at the Signal Corps stations: Pike's Peak, 16,091 miles; North Platte, 13,249; Breckeuridge, 12,007; Cape Lookout, 10,626; Key West, 10,552; Portsmouth, N. C., 10,510; Cape May, 10,087; Thatcher's Island, 10,010; Sandy Hook, 9,855; Yankton, 9,657; Kittyhawk, 9,411; Punta Rasa, 9,219; Sandusky, 8,809; Indianola, 8,745; Bismarck, 8,720; Cape Hatteras, 8,543. The *smallest* movements were: Silver City, N. M., 1,148 miles; La Mesilla, N. M., 1,512; Visalia, Cal., 1,656; Lynchburg, 1,821; Roseburg, Or., 1,997; Laredo, Tex., 2,031; Fredericksburg, Tex., 2,209; Uvalde, Tex., 2,379; Shreveport, 2,511; Indianapolis, 2,495; Deadwood, 2,532; Socorro, N. M., 2,548; San Antonio, Tex., 2,637; Graham, Tex., 2,679; Brownsville, Tex., 2,773.